

MISSOURI CONSERVATIONIST

VOLUME 86, ISSUE 8, AUGUST 2025
SERVING NATURE & YOU



BE BEARWISE

OUTDOOR SAFETY TIPS

Black bears are seldom aggressive and rarely injure people. Follow these BearWise tips to avoid encounters.



Hiking and Walking

- Be aware of your surroundings.
- Try not to hike alone.
- Keep kids within sight and close by.
- Make noise periodically so bears in the area can avoid you.
- **Keep dogs leashed at all times or leave them at home.** Don't force a bear to defend itself.
- Double bag your food and pack out all food and trash.



Camping

- Keep a clean camp.
- Don't burn food scraps or trash in your fire ring or grill.
- **Do not store food, trash, clothes worn when cooking, or toiletries in your tent.**
- Cook downwind and as far from your tent as possible.
- Set up backcountry camps away from dense cover and natural food sources.



Fishing and Hunting

- You are more likely to encounter bears when moving quietly and when traveling early and late in the day.
- Follow tips for hiking and camping safely.
- Harvested animals and fishing bait may attract bears.
- If a bear beats you to your catch or kill, don't try to reclaim it. Leave the area when it is safe to do so.



Cycling and Jogging

- If you travel quickly or quietly, you can easily surprise bears. Music and phones are distracting. Stay aware of your surroundings and make noise periodically.

If You Encounter a Black Bear

- **If you see a bear before it notices you**, don't approach. Stand still, enjoy the moment, then quietly move away.
- **If a bear sees you**, back away slowly. Never run. Running may trigger a chase response.
- **If a bear approaches**, hold your ground, wave your arms, and yell "Hey bear!" until it leaves. Always stay with your group. **If the bear keeps approaching**, use bear spray.
- **If a black bear makes contact with you**, do NOT play dead. Instead, fight back aggressively.



Learn more at
BEARWISE.ORG





ON THE COVER

Eastern hellbender

NOPPADOL PAOTHONG

24mm probe lens, f/14

1/160 sec, ISO 6400

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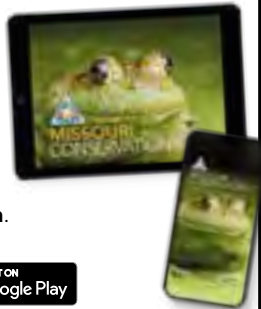
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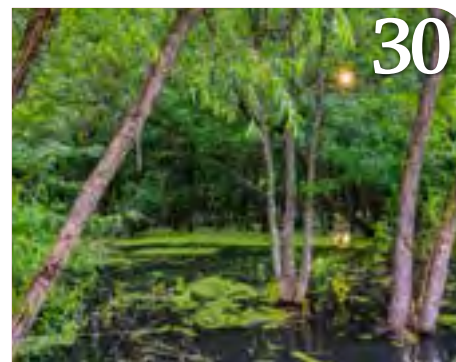
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Want to see your photos in the *Missouri Conservationist*?

Submit your photos online via [flickr.com/groups/mdcreaderphotos-2025/](https://www.flickr.com/groups/mdcreaderphotos-2025/), mdc.mo.gov/magazine-reader-photos or by emailing readerphoto@mdc.mo.gov

1 | Bobwhite quail
by **Caleb Nelson**,
via Flickr

2 | Fawn by **Steven
Haddix**, via Flickr

3 | Sunfish double by
Michael Summers,
via email submission

4 | Pawnee Prairie
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by **Steven Kinder**, via
website submission

➔ In the December issue we plan to feature even more great reader photos. Send in your best year-round pictures of native Missouri wildlife, flora, natural scenery, and friends and family engaged in outdoor activities. Please include where the photo was taken and what it depicts.



Letters to the Editor

Submissions reflect readers' opinions and may be edited for length and clarity. Email Magazine@mdc.mo.gov or write to: MISSOURI CONSERVATIONIST PO BOX 180 JEFFERSON CITY, MO 65102

FISHING BUDDIES

The article about the fishing buddies, one being neurodivergent, was excellent and an eye-opener [*Focused on the Moment*, June, Page 10]. I applaud the older gentleman for his compassion and patience and the younger man for his persistence and grit. Their love of fishing brought them together and helped them overcome any obstacles.

We all can take the time to seek out those special people and find common interests to enhance our lives. The article does a beautiful job of drawing attention to autism and neurodivergence and shows that life can still be beautiful.

Donna Roche St. Louis

SOCIAL SCIENCE

Thank you for the article on the work of Dr. Ellie Prentice [*Nature Lab at Work*, April, Page 4]. Social science has everything to do with investigating and understanding the relationship between people and the environment. How do folks perceive the landscape and its inhabitants? What are Missouri's traditions that need to be maintained, highlighted, and expanded? Are there areas, activities, and groups underserved? What do people do on their own or in groups?

You are lucky to have this department and publication to inform, encourage, and celebrate what the state has to offer in the great outdoors. It is all the people — recognized or not — working together to make this happen.

I am grateful to my sister, Susan, who saves the magazines and passes them on to me.

Dr. Nancy Fischer, Retired, Professor
Emerita of Sociology Middletown, Indiana

Up Front



✱ The heat that accompanies the dog days of summer has me wishing for refuge in one of Missouri's many cool or cold-water streams. Some of these streams are inhabited by one of Missouri's rarest and coolest animals, the hellbender. To learn more about our efforts to restore these iconic animals, see *Wrinkled, Rare, and Remarkable* (Page 10).

Despite the heat and long days, the distinctive sound of a squirrel cutting hickory nuts signals that fall is on the way. The quiet anticipation of many opening hunting seasons is joined by a flurry of activity, including whitetail bucks shedding their antler velvet as their antlers calcify and harden, thousands of mourning doves arriving, early season teal appearing at wetlands, and black bears fattening up on soft mast, like blackberries, before the acorns drop.

None of this would be possible without the decades-long commitment of landowners, hunters, anglers, passionate conservationists, numerous conservation partners, and the dedicated team at MDC. To learn more about the work of our MDC team to manage many of these species, see *On the Front Lines of Fauna* (Page 16).

August is also an opportunity to visit our amazing team at the Missouri State Fair (Page 5). You might see me there — I'll be the one gawking at the giant catfish or other cool species that inhabit the ever-popular aquariums.

Regardless of what you're doing this month, stay cool and enjoy the anticipation of the adventures that lie ahead.

JASON SUMNERS, DIRECTOR

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Our Mission

The Missouri Department of Conservation protects and manages the fish, forest, and wildlife of the state. We facilitate and provide opportunity for all citizens to use, enjoy, and learn about these resources.



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Nature LAB^{at} WORK

by Angie Daly Morfeld

The Missouri Department of Conservation team is diverse and dedicated to conserving, protecting, and improving our fish, forest, and wildlife resources.

Alex Morpew

POLLINATOR ECOLOGIST AND ENTOMOLOGIST

✳️ As the department's pollinator ecologist and general entomologist, most of Alex Morpew's work focuses on pollinator conservation. However, she is also responsible for much of the department's work with nonaquatic insects and invertebrates.

A TYPICAL DAY

Morpew says a typical day for her depends on the season and the weather forecast.

"In the spring, summer, and fall, I alternate between conducting field work for research, inventory, and monitoring projects and catching up on work in the office," Morpew said. "Basically, this means, if it's not raining, I'm probably outside catching insects and surveying flower communities."

Most of the winter months are spent in the lab, studying and identifying the insects collected over the year.

"Insects are foundational to ecosystem function, so working to understand, conserve, and educate people about insects is my contribution to making the world a better place."



MDC pollinator ecologist Alex Morpew conducts a pollinators survey at Tucker Prairie near Kingdom City.

NOTABLE PROJECTS

In 2024, Morpew worked on a pollinator and plant inventory in south-east Missouri. The project required regular visits to the few remaining sand prairies in the Bootheel.

"These natural communities are so unique, and increasingly rare, so taking the time to learn more about the special plants and insect species that are restricted to these habitats only deepened my appreciation for Missouri's diversity," Morpew said.

Morpew has also assisted with the Missouri Bumble Bee Atlas, a statewide community science project focused on tracing and conserving our native bumblebees.

"I am incredibly proud of the work we have done with the Missouri Bumble Bee Atlas," Morpew said. "Although I was not in this position when my predecessors started this project, I feel so fortunate to have the opportunity to provide support for our coordinators and volunteers, who are so enthusiastic and motivated. They have impressed me each and every summer with their commitment to conducting bumblebee surveys and contributing to this important effort."

HOW YOU CAN HELP

Sign up to conduct surveys for the Missouri Bumble Bee Atlas and/or the Monarch Joint Venture Integrated Monarch Monitoring Program. Download iNaturalist to your phone and take pictures of insects and plants to add to our overall understanding of diversity throughout the state. Just go outside, sit or take a slow walk, and learn to notice and appreciate insects without fear and judgment. "This is key to insect conservation."

Her Education

- Bachelor's degree, University of Colorado (Boulder): ecology and evolutionary biology
- Master's degree, Wichita State University: biological sciences

In Brief

News and updates from MDC



MEET MDC AT THE FAIR

DISCOVER
NATURE AT THE
MISSOURI STATE
FAIR AUG. 7-17

➔ MDC will be at the Missouri State Fair in Sedalia all 11 days, giving you a chance to discover nature in the heart of the fairgrounds.

Visit the Conservation Building from 9 a.m. to 7 p.m. to see live fish and other native animals such as snakes, turtles, and amphibians. See displays of native plants and learn how they help butterflies and other important pollinators. Ask MDC staff conservation-related questions, get educational materials, and have fun.

Join us Friday, Aug. 8, for Missouri Department of Conservation Day — a full day of fun and excitement sponsored by MDC!

Stop by our outdoor pavilion for these live demonstrations:

Live Raptors: See live birds of prey at the Raptors of Missouri presentation with Dickerson Park Zoo on Thursday, Aug. 7, at 11 a.m., 1:30 p.m., and 4 p.m.

Fish Fry: Join us for fish cooking and cleaning demonstrations on Friday, Aug. 8, and Saturday, Aug. 9, at 11 a.m. and 1:30 p.m.

Invasive Invaders: Find out how to get invasive plants and animals out of Missouri with displays and activities on the MoDOT lawn next door to the MDC Pavilion all day on Friday, Aug. 8.

Conservation Volunteers: Learn how to become a volunteer for conservation, including Stream Team and Master Naturalists, Monday, Aug. 11, from 10 a.m. to 2 p.m.

Conservation K-9s: Meet the dogs who are specially trained for conservation work Tuesday, Aug. 12, and Wednesday, Aug. 13, at 11 a.m. and 1:30 p.m.

Historic Sawmill: See a working scale model sawmill in action on Thursday, Aug. 14, at 11 a.m. and 1:30 p.m.

Foraging and Wild Edibles: Learn how to forage for edible plants, seeds, and fruits on Friday, Aug. 15, at 11 a.m. and 1:30 p.m.

Montauk Fish Hatchery Truck: Chat with staff from the Montauk Fish Hatchery and see the vehicle they use to stock fishing spots on Saturday, Aug. 16, from 10 a.m. to 2 p.m.

Campfire Cooking: Learn how to cook at the campsite on Sunday, Aug. 17, at 11 a.m. and 1:30 p.m.

Peregrine falcon





NEVER LOSE TOUCH

Think back to when you were a kid and how and where you connected with nature. Remember the good feelings and fun? Now is a great time to relive those memories. Get outdoors with family and friends. Take a walk in the woods or get out on the water to relax, unwind, and connect with nature. Make some new memories and Never Lose Touch. Find more fun ideas at mdc.mo.gov/never-lose-touch.

NEW MDC HUNTING BOOKLETS AVAILABLE

Missouri deer, turkey, waterfowl, and dove hunters can get current information on fall hunting from MDC's *2025 Fall Deer & Turkey Hunting Regulations and Information* booklet and the *Migratory Bird and Waterfowl Hunting Digest 2025-2026*.

The *2025 Fall Deer & Turkey Hunting Regulations and Information* booklet has detailed information on fall deer and turkey hunting seasons, limits, permits, managed hunts, regulations, conservation areas to hunt, post-harvest instructions, chronic wasting disease (CWD) updates, and more.

The *Migratory Bird and Waterfowl Hunting Digest 2025-2026* has detailed information on waterfowl hunting along with hunting doves and other migratory game birds such as rail, snipe, and woodcock. It also has information on needed permits and duck stamp requirements, hunting seasons and limits, hunting areas, regulations, and more.

Both booklets are available where permits are sold and online at mdc.mo.gov. Be sure to purchase your hunting and fishing permits from local vendors or at mdc.mo.gov/buypermits.

Ask MDC

Got a Question for Ask MDC?

Send it to AskMDC@mdc.mo.gov or call 573-522-4115, ext. 3848.

Q: My daughter harvested a turkey this spring that had a beard with a light brown colored tip. A couple years ago, a visiting jake had the same color on the tip of his small beard. Are they related?

➔ A melanin deficiency — the result of a nutrition deficiency — caused this unusual beard coloration, said MDC Turkey Biologist Nick Oakley.

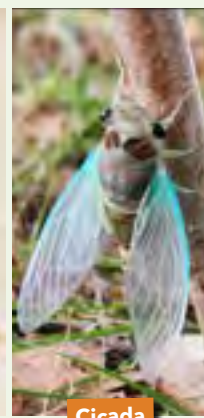
Wild turkey beards are often black. Melanin is the most common pigment in birds, but when melanin production is interrupted, beards can be rust or blond colored. If melanin production is reestablished, white streaks can be left behind, making beards brittle. This can lead to breakage, which hunters sometimes call "beard rot." But the beard isn't rotting, it's being sheared off.

According to the Audubon Society, turkeys can lose their beards several ways. Longer beards can snap from the weight of ice or fray from being dragged over stony ground.

"It is not at all out of question that this could have been the jake you saw — the coloration likely persists," Oakley said. "And, like hair, the part furthest from the bird's body is the oldest. It is a pretty neat beard for your daughter to remember the hunt by!"



Turkey beard



Cicada

Terrain heavily influences beard length. Turkeys inhabiting rocky terrain may have overall shorter beards than individuals foraging across flat, sandy ground.

Q: Is this a cicada? Why the lovely gossamer wings?

➔ This cicada has very recently emerged from its shell, and it will turn a more natural green-brown color after it dries fully. This individual is one of Missouri's native annual or dog-day cicadas in the *Neotibicen* genus.

Unlike the 13- or 17-year periodical cicadas, we see (and hear) adult dog-day cicadas each year. However, these cicadas don't have just a one-year life cycle. Nymphs spend two to five years underground, feeding on the sap of plant roots before emerging as adults during the dog days of summer.

Nearly 30 cicada species occur in Missouri, with many species having annual emergences of adult cicadas. Dog-day cicadas, especially, often can be identified by their song and the time of day they sing.

Q: What type of caterpillars are these?

➔ Fuzzy walnut caterpillar moth larvae (*Datana intergerrima*) are often found on eastern black walnut trees, but they also feed on pecans and various species of hickory. Rarely, these caterpillars can occur in such high numbers that they defoliate trees. Birds generally prey heavily on these caterpillars when they gather, helping keep their populations in check.

With wingspans of 1¾ inches, they are a medium-sized moth. Their brown, tan, and cream banding helps camouflage them well.

Walnut caterpillar moths have two generations per year — one in early summer and the second in early fall. Female moths lay eggs on the



Fuzzy walnut caterpillars

undersides of leaves in masses, and when the larvae hatch, they feed on leaves in gregarious groupings. When they are ready to molt (shed) their skins, they migrate down their host tree's trunk. Once there, the molting is synchronized, with nearly all caterpillars in a cluster molting at the same time and leaving behind a mass of empty, hairy caterpillar skins. Once fully sized, caterpillars leave the tree to pupate in the soil.

What IS it?

Can you guess this month's natural wonder?

The answer is on Page 9.



Corporal Jared Kelly

MACON COUNTY
CONSERVATION AGENT

offers this month's

AGENT ADVICE

If you want to think of September as the opening of fall hunting season, then August is your preparedness month. Whether you hunt doves, deer, turkey, migratory birds, or waterfowl, there is something you could do to get ready for your opening day. Start with your firearm. Make sure it is in proper working order by visiting a shooting range. MDC has staffed and unstaffed ranges located across the state. To find one near you, visit short.mdc.mo.gov/Z9W. If you're using a tree stand, get it out and make sure all the pieces fit together properly, any moving parts move like they should, and all straps and tethers are still properly sewn. Let's make this season a fun and safe one.



GRILLED TROUT STUFFED WITH TOMATO AND BASIL

On those hot summer nights when it is just too hot to cook, fire up the grill. Let your delicious Missouri ingredients – from fresh-caught trout to homegrown tomatoes and basil – be the star of this dish.

Serves 2-4

INGREDIENTS:

2 whole trout (cleaned, boned, and butterflied)
Extra-virgin olive oil
Salt and freshly ground pepper
1 medium red ripe tomato, sliced
8 large fresh basil leaves
2 tablespoons freshly grated Parmigiano-Reggiano cheese
4 slices bacon

This recipe is from *Cooking Wild in Missouri* by Bernadette Dryden, available for \$16 at most MDC nature centers and online at mdcnatureshop.com.



RINSE well both sides of fish and pat dry with a paper towel. On a baking sheet, place fish skin-side down, opening them flat like a book. Drizzle a teaspoon or so of olive oil over flesh of trout and rub in the oil. Sprinkle with salt and pepper. Place two slices of tomato on one half of the trout, topping each slice with two basil leaves. Sprinkle the length of the trout with 1 tablespoon cheese.

FOLD unadorned side of the fish over the other side and wrap the whole fish in a spiral fashion with bacon; two bacon slices secure a medium-sized trout nicely. Repeat procedure with the other fish. Grill (or broil in oven) until bacon begins to crisp and trout is cooked through.

SIDE dishes that accompany nicely include fresh whole new potatoes; corn on the cob; green beans; cucumber, onion, and sweet red-pepper rings in an herby vinaigrette; and crusty white bread.

SEND IN ARBOR AWARD NOMINATIONS

MDC and the Missouri Community Forestry Council (MCFC) are accepting nominations for the 2025 Missouri Arbor Award of Excellence until Aug. 18. The annual award recognizes communities, institutions, businesses, organizations, and individuals that make significant and long-lasting efforts to care for trees in their communities.

The Arbor Award of Excellence shines the spotlight on anyone who has improved trees in their community. Any significant program, project, or event over the last two years that contributes to the care or maintenance of trees could qualify for an award.

"Trees are such an important part of our communities, and we want to honor those people and organizations who have gone above and beyond to care for and promote trees in cities throughout Missouri," said MDC Community Forest Coordinator Russell Hinnah. "I encourage you to think about recent projects and events involving trees in your community and nominate them for the 2025 Arbor Award of Excellence."

Winners receive a framed award, a full registration scholarship to the MCFC conference in September, an extra ticket to the award banquet during the conference, a community forestry reference book, and a \$50 gift card.

Nominations are due by Monday, Aug. 18. For more information and to download a nomination form, visit short.mdc.mo.gov/ZCg.



**INTERESTED IN BECOMING
A CONSERVATION AGENT?**

APPLY TODAY!



WHAT IS IT? LONGEAR SUNFISH

The longear sunfish gets its name for its "ear" — an elongated flap that covers its gills. At 5 to 6 inches long, it's a small, colorful fish. The back and sides are blue-green, speckled with yellow and emerald; the belly is yellow or orange. The side of the head is olive or light orange with sky-blue maplike markings. It's the most abundant sunfish in the southern half of Missouri.



**The eastern hellbender
is North America's
largest aquatic
salamander.**

**PHOTOGRAPH BY
NOPPADOL PAOTHONG**





WRINKLED, RARE, AND REMARKABLE

PARTNERSHIP AND
PATIENCE SOW SUCCESS
IN RESTORING MISSOURI'S
HELLBENDER POPULATION

by Jill Pritchard

On a cool and foggy September morning, Missouri State Herpetologist Jeff Briggler gently paddles his canoe to a stopping point on an Ozark stream. Taking inventory of his surroundings, checking his data sheets, and surveying the shore, he decides he's in the right place.

"We have several artificial nest boxes on this stream, and one of them is a fairly consistent box," Briggler explains. "Since we put this box here 12 years ago, the same male has bred in there 11 times. So, he's kind of my first representative of the year to look for eggs."

This is Briggler's first day of the 2023 fall season searching for hellbender eggs, particularly from the eastern subspecies, which lays eggs earlier than its Ozark relative. Before zipping up his wetsuit, he takes a moment to record some data.



A CREATURE FROM THE UNDERWORLD

The etymology of “hellbender” is unclear, but one theory claims the salamander was named by settlers who noted it appeared to be a creature from the underworld, where “it’s bent on returning.” With their wide, flat heads, tiny eyes, rudderlike tail, and long bodies covered with prominent folds of skin, hellbenders possess a unique appearance. In recent years, it has been tagged with more positive nicknames on social media, including water dog, snot otter, and “ol’ lasagna sides.”

Missouri is the only place in the world where both Ozark and eastern hellbender subspecies can be found. Eastern hellbenders are slightly larger, measuring between 13–23 inches. Ozark hellbender adults average between 10–21 inches. Perhaps the easiest way to distinguish between the two is geographically — Ozark hellbenders are found in south-flowing rivers in the southern Missouri Ozarks, while eastern hellbenders are found in north- and northeast-flowing rivers in the northern Missouri Ozarks.

Tailor-made for an entirely aquatic existence, hellbenders’ flat heads and streamlined shapes reduce water resistance, allowing them to live under flat rocks and bedrock crevices. They’re slow swimmers and often move by walking along the bottom of streams and rivers. Numerous wrinkly folds of skin along the hellbenders’ sides provide increased surface area for respiration. Capillaries near the surface of their wrinkly skin absorb oxygen directly from the water. Because they require cool, well-oxygenated, and clean-running water to survive, hellbenders are a major indicator of overall river or stream health.

“Even though we’re looking for eggs, I will do a count on the hellbenders I see today, and tally those so we know how many have been observed during the course of the day and at what locations,” he explains.

After noting the location, time, and water temperature, Briggler secures a weighted belt to his waist, puts on a pair of goggles and a snorkel, and dives underwater. He finds no eggs in the nest box but returns from the water holding a hellbender — the largest species of salamander native to North America.



Hellbenders' flat heads and streamlined shapes reduce water resistance, allowing them to live under flat rocks and within bedrock crevices. Wrinkly folds of skin along their sides provide increased surface area for respiration.



Rivers in southern Missouri and northern Arkansas once supported up to 45,000 hellbenders. Today, only about 2,000 exist in the world — so few that both Ozark and eastern subspecies have been added to the federal endangered species list. The biggest threats hellbenders face include habitat alteration and degradation, disease, predation, and degraded water quality.

HELLBENDER HUSBANDRY

In the early 2000s, MDC partnered with the Ron and Karen Goellner Center for Hellbender Conservation, a part of the Saint Louis Zoo WildCare Institute, and other agencies to breed hellbenders in captivity and rear eggs collected from the wild to combat drastic population declines.

“Ron Goellner, our former director of animal care at the Saint Louis Zoo, was a huge advocate for Ozark hellbenders, and he wanted to ensure we were doing something to help these animals,” explained Justin Elden, curator of herpetology and aquatics at the Saint Louis Zoo and director of the Saint Louis Zoo WildCare Institute Ron and Karen Goellner Center for Hellbender Conservation. “The center was later renamed to highlight Ron’s wife, Karen, who was also a champion for these animals.”

Hellbenders require specialized habitats, living only in fast-flowing, cool, and heavily oxygenated streams. Recreating this habitat at the zoo’s herpetarium was crucial in successfully breeding and rearing these animals. Behind the scenes is a fully-functioning, 32-foot-long, constructed Missouri stream, complete with a rock bed, the occasional afternoon rain shower, and the area’s freshest and purest water.

“Water parameters at the zoo have to match what hellbenders need in the wild,” Elden noted. “Our zookeepers are not only taking care of the animals, but they’re taking care of the water they live in because the two are so closely intertwined.”

To ensure proper care for the hellbenders and their habitat in the herpetarium, the zoo employs a team of four zookeepers who exclusively work with hellbenders, conducting daily water quality tests and documenting every detail. An on-site veterinary staff addresses any animal health concerns, and a heating, ventilation, and air conditioning department ensures the herpetarium’s systems have clean, flowing, cool water.

“We literally wrote the book on hellbender husbandry and hellbender care,” Elden said. “This is the largest program like this in existence, but nature was the first to do this. We listened to nature and replicated it at the zoo.”



Hellbender conservation at the Saint Louis Zoo



Larval eastern hellbender

Once captive-bred larvae reach between 3–8 years old, they are released in their native Ozark aquatic ecosystem. Biologists began releasing a few zoo-raised hellbenders in Missouri in 2008, later increasing the number of released animals to 1,000 or more per year beginning in 2012. Ultimately, more than 12,000 zoo- and hatchery-raised Ozark and eastern hellbenders have been released into their native rivers.

To track the restoration progress, biologists monitor the population status of both wild animals and released animals reared in captivity, as well as locate natural nests within rivers during the fall to collect eggs that can be reared and released in the future.

Most hellbenders existing in the wild and all 12,000-plus released animals have a small chip embedded under their skin that allows scientists to identify the animals in future encounters.

Though many have been released to the wild, most hellbenders are only just now becoming mature enough to breed. Because very few nests with eggs are found each year, capturing the event of a male attending a clutch of eggs is a rare event.

“We’re lucky to find 20 nests in the wild a year and finding a tagged father that was raised at the Saint Louis Zoo was like finding a needle in a haystack,” Briggler explained.

Researchers found that needle in October 2022, when they came across a tagged male Ozark hellbender that was attending a clutch of healthy, well-developed eggs on the Current River. The animal was guarding a total of 128 eggs. Upon a later return to the nest, the eggs were beginning the process of hatching with a father protecting them.

Roughly a year later, researchers found evidence of the first zoo-raised eastern hellbender reproducing in the wild, this time on the Gasconade River.

“Rarely are hellbender nests found on the Gasconade River,” noted Briggler. “Therefore, it was a pleasant surprise to even find a nest, but an overwhelming surprise to learn the father was a released animal.”

Though these two incidents were the first time researchers documented zoo-reared animals reproducing in the wild, Elden does not believe they were isolated incidents.



Hellbender eggs

Briggler holds eastern hellbender eggs found during a nest survey. Nests usually contain two strands of 100 to 350 eggs.



“I think reproduction has happened with other zoo-reared animals who were not in areas we surveyed, but these two incidents were the first ones we found,” he explained. “And I don’t think it’s going to be the last ones we find — I think it’s going to happen more often, which is huge.”

‘LITTLE GOLDEN NUGGETS’

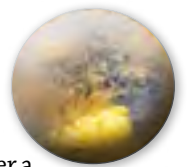
Unlike many species, the male hellbender takes a more active role in breeding. In the fall, he will begin making nests by digging under a large rock and then wait for a female to come and lay eggs in the nest, usually two strands of 100 to 350. The male will spray his sperm on the eggs, and the female will leave. He then guards the eggs, which hatch in four to six weeks, and watches over the babies until they leave the nest in late winter or early spring.

Because hellbenders spend most of their lives under rocks, it’s important to leave rocks where they’re found naturally; hellbender homes can be destroyed when people disrupt their habitat by moving rocks.

To give hellbenders a better chance, Briggler and MDC fisheries staff John Ackerson and Chuck Wichern created the first hellbender nesting box of its kind.

“We developed some prototypes in 2008 and 2009,” Briggler recalled. “We put a few in the wild and had a few animals using them, but after learning more about the rocks they preferred, we settled on one design. In 2010, our first true test, we installed seven boxes in June 2010 in an Ozark hellbender stream.”

Briggler and his team returned to check if their nesting boxes were in use later that fall.





Missouri is the only place in the world where both eastern and Ozark hellbenders can be found. Eastern hellbenders are slightly larger, measuring up to 23 inches. Ozark hellbenders can measure up to 21 inches.

"I went up to box number six and a male tried to bite me," laughed Briggler. "But that was a good sign he was likely defending a nest. When we opened the lid of the box, we found well-developed eggs. The sunlight was hitting them, and they shimmered like little golden nuggets."

Following that successful use, researchers added numerous nest boxes in multiple rivers across Missouri.

PROTECTING THE GHOSTS

In addition to the Saint Louis Zoo, MDC has partnered with the U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, Arkansas Game and Fish Commission, and other agencies to enhance propagation efforts to ensure hellbenders remain a part of Missouri's biodiversity.

Most Missourians can't recreate Ozark streams in their backyard to breed and raise hellbenders, but several things can be done to help Ozark and eastern hellbenders.

If you accidentally catch a hellbender while fishing, cut the line near the head and release it back into the river. The hook will rust away in a few weeks. You should also report the incident by calling your local MDC office or conservation agent. (See Page 3 for contact information.)

Respect Missouri's waterways, and hellbenders' homes, by keeping rivers and streams clean. Leave no trace when outdoors or join a local Stream Team to care for and monitor rivers.

Seeing hellbenders in the wild is a rarity because they're so endangered. It's unlawful to search for wild hellbenders because it could destroy their habitat.

"My hope is that someday, it will be commonplace for people to see them," Elden said. "But at this point in time, they're ghosts to an extent, and that's the way it should be. Until they've completely rebounded, they need privacy, and they need patience."



Eastern hellbender



Ozark hellbender

However, Elden says the most meaningful hellbender act is to take pride in the individuality this species offers.

"This weird, ugly animal, especially the Ozark subspecies, is yours," said Elden. "It's an animal that belongs to our state and to our Ozark plateau and we should be insanely proud of that." ▲

MDC Statewide News Services Coordinator Jill Pritchard is the host of MDC's award-winning podcast, Nature Boost. Scan the QR code to find her 2024 two-part podcast featuring hellbender restoration.



ON THE FRONT LINES *of Fauna*

MDC'S MISSION TO MANAGE WILDLIFE

by Lauren Hildreth

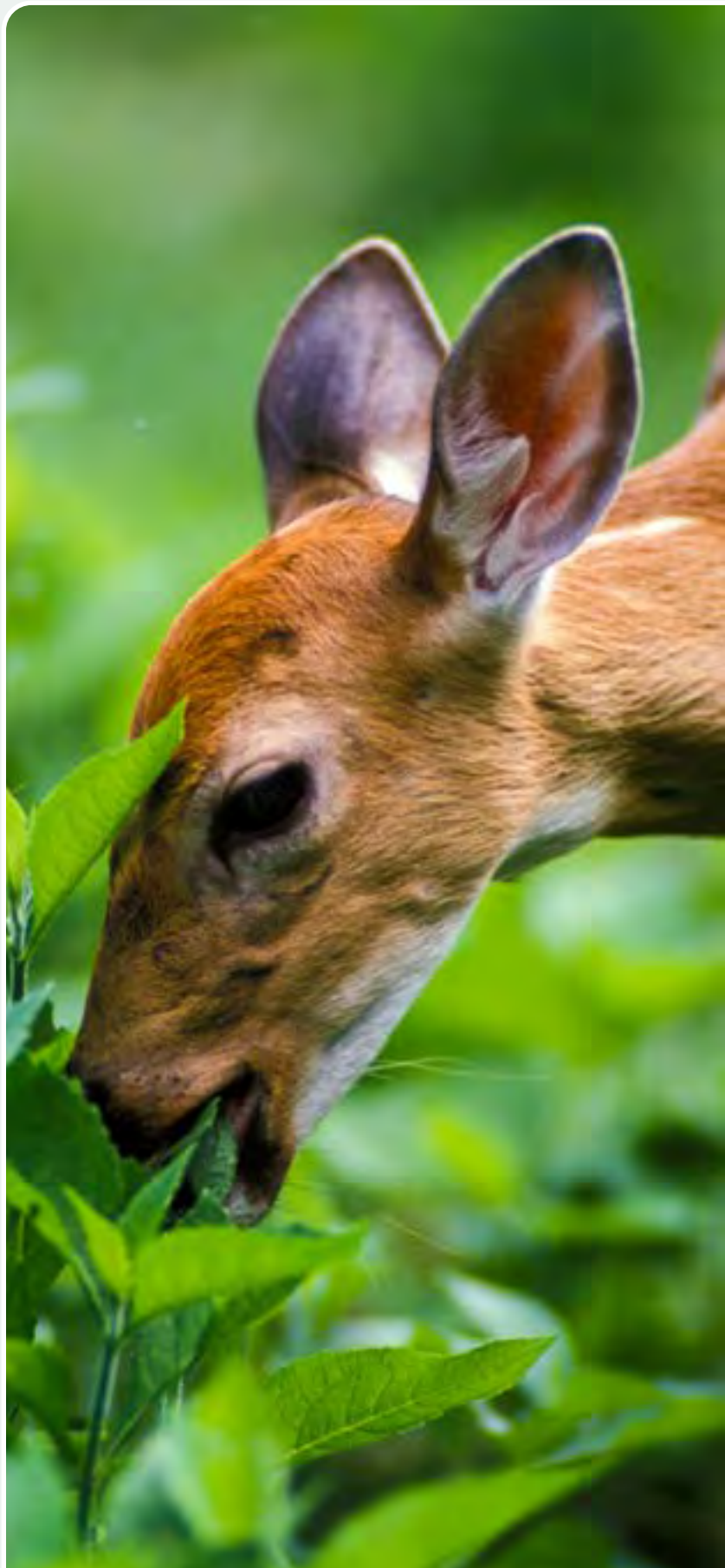
During the winter of 2023, MDC's deer biologists gathered to begin updating the department's White-tailed Deer Management Plan. The cumbersome task of keeping management plans up to date is key to the long-term health of our Missouri fish and wildlife species.

This wasn't the first time experts gathered to think about the management of a species. In 2020, three different management plans were completed — the Wild Turkey Management Plan, the Elk Management Plan, and the Black Bear Management Plan. The development of those plans was a multi-year endeavor that involved MDC staff around the state and lots of public involvement. For example, during the development of the Black Bear Management Plan, MDC hosted four open houses for citizens to learn about the draft plan and provide thoughts and comments. These comments were reviewed and helped influence the final plan.

WHAT IS A MANAGEMENT PLAN?

Many of the state's harvestable fish and wildlife species have statewide management plans to guide regulations and on-the-ground habitat work. Each plan includes high-level goals and objectives and includes the strategies needed for MDC staff and partners to accomplish those goals.

MDC subject matter experts start the process by revising a previous plan or developing a new one from scratch. Once the initial work has started, larger groups of MDC staff and external partners are brought in to refine the draft plan. Once the internal work is completed, management plans are released for public comment before being finalized.





Management plan decisions are not made in a vacuum. Many people have a vested interest in the future of our fish and wildlife species and input is taken into consideration when making management decisions.

While MDC has management plans for many wildlife and fish species, we will look at objectives from the deer, elk, bear, and turkey management plans to illustrate how they guide our work.

WHITE-TAILED DEER (*Odocoileus virginianus*)

Deer hunting regulations and chronic wasting disease (CWD) management are so intertwined, it's hard to talk about one without the other. CWD is a growing challenge within Missouri's deer herd.

"The longer we can slow the spread of CWD, the healthier our deer population will be," said Deb Hudman, MDC wildlife health program coordinator. "Hunters and landowners are key partners in helping MDC monitor and manage CWD."

Annual deer hunting regulations are set through a consistent process, including public surveys, to better understand their desires and perceptions of the deer herd. Hunters and landowners are also

surveyed to determine, at the county level, how they feel about deer numbers. Hunter surveys also ask about hunt quality and amount of hunting opportunities through the season. Those hunter and landowner perceptions are used to assess whether current deer population numbers are appropriate and whether changes to hunting regulations are needed. MDC strives to maximize opportunity, decrease regulatory complexity, and sustain the hunting culture within Missouri.

MDC is actively involved in both CWD surveillance and management. Surveillance involves collecting and testing samples from deer across the state. This is done in partnership with taxidermists, meat processors, and hunters. Surveillance

allows MDC to detect where CWD is present, which in turn guides where management actions are needed. CWD management is focused on slowing the spread of the disease. For example, regulations prohibiting the placement of feed and minerals for deer are implemented at the county level to reduce unnatural deer congregation. In areas where CWD has been detected, targeted removal is conducted in a focused zone, typically within a 2-mile radius of a positive case.

WHITE-TAILED DEER MANAGEMENT PLAN GOALS:

GOAL 1: Deer
Population
Management

GOAL 2: Hunting and
Recreation

» **OBJECTIVE 2.2:**
Establish a deer
hunting season
structure and
regulations that
promote hunter
participation,
recruitment, and
retention.

GOAL 3: Deer Health
and Disease

» **OBJECTIVE 3.2:**
Conduct
management
practices that
limit CWD
prevalence and
minimize the
spread of CWD
in the deer
population.

GOAL 4: Education,
Communication, and
Public Engagement

GOAL 5: Research



During the opening weekend of rifle season, MDC employees operate mandatory sampling stations to test harvested deer for CWD.

ELK (*Cervus canadensis*)

To accomplish objective 1.3, MDC Elk Biologist Aaron Hildreth evaluates the elk population on an annual basis. The intent of management at this time is to increase the number of elk, while also providing a limited hunting opportunity for select Missourians. This is done by allocating a conservative number of hunting permits and only allowing the harvest of males.

Surveys were sent out two different times — in 2018 and in 2024 — to get input from Missourians about how the elk season could be structured. The 2018 survey focused on the initial establishment of a hunting season, and the 2024 survey focused on how the season could be structured when cow elk are able to be harvested.

Survey respondents provided comments on aspects of the permit application and hunting season, from sit-out periods for successfully drawn hunters to timing of the firearms and archery portions of the season. This feedback was then used to help shape the recommendations Hildreth made to the regulations committee and commission.

“We wish to have elk into the future,” Hildreth said. “By providing a regulated harvest, we’re able to provide Missourians an opportunity to pursue elk in a way that is not deleterious to the population.”

Have you seen an elk in Missouri? You can help biologists understand elk and their movement. Report sightings at short.mdc.mo.gov/49U.

ELK MANAGEMENT PLAN GOALS:

GOAL 1: Elk Population Management

- » **OBJECTIVE 1.3:**
Establish effective
harvest guidelines
for management of
elk on both public
and private lands
to meet population
goals.

GOAL 2: Hunting and Wildlife Viewing

GOAL 3: Education, Communication, and Public Engagement



DAVID STONNER



BLACK BEAR MANAGEMENT PLAN GOALS:

GOAL 1: Use science-based methods to manage a self-sustaining population of black bear, focusing on research and monitoring, population management, and habitat management.

GOAL 2: Increase statewide awareness of Missouri's black bear population and management program through coordinated outreach and public education.

GOAL 3: Minimize and address human-bear conflicts.

» **OBJECTIVE 3.1:**
Actively promote proactive measures to prevent/minimize human-bear conflicts.

BLACK BEAR (*Ursus americanus*)

Bears and people can live together, and MDC's Black Bear Biologist Nate Bowersock wants Missourians to know that.

"When people are thoughtful about living in bear country, we limit the number of human bear conflicts," said Bowersock. "By focusing on minimizing and preventing conflicts with bears now, we can be better prepared to respond to the presence of bears as their population grows."

To prepare Missourians for potential or upcoming bear activity, MDC regularly finds different outlets to educate people about bears. In addition, staff promptly respond to reports of bear activity and provide information about how to remove or secure food attractants, like bird feeders or bee hives, that greatly reduce the chances of conflict to occur.

Take two different bears. Bear number one got into some neighborhood trash but no one reported the incident. The bear continued to search that neighborhood for food, eventually breaking into a rental cabin and eating a pot roast in the crockpot. That bear had to be trapped and euthanized. Bear number two was getting into bird feeders in a neighborhood. MDC was notified and talked with neighbors about temporarily removing their bird feeders. With no attractive meal easily available, the bear moved on.

In both examples, a bear encountered food sources, but the outcomes were very different. Missourians living or recreating in bear country need to know what habits to modify to live responsibly with bears.





WILD TURKEY MANAGEMENT PLAN GOALS:

GOAL 1: Use monitoring and research to maintain long-term stability of the wild turkey population.

GOAL 2: Create, improve, and maintain habitats that benefit wild turkeys on public and private lands.

» **OBJECTIVE 2.1:**

Establish, improve, and maintain habitats that benefit wild turkeys on public lands.

» **OBJECTIVE 2.2:**

Establish, improve, and maintain habitats that benefit wild turkeys on private lands.

GOAL 3: Promote turkey hunting and provide opportunities to enjoy wild turkey-related recreational activities.

GOAL 4: Engage and educate stakeholders about wild turkey management through coordinated outreach.

GOAL 5: Minimize and address wild turkey damage and wild turkey-human conflicts.

WILD TURKEY (*Meleagris gallopavo*)

Creating and maintaining good turkey habitat is a collaborative endeavor.

“Public buy-in is critical for the management of the wild turkey,” said MDC Turkey Biologist Nick Oakley. “Ninety-three percent of Missouri is privately owned, so we can’t make any substantial improvements without the help of those landowners.”

Since private land managers are critical to the success of the turkey population, the outreach and education portion of the management plan is key. A lot has been learned in the last decade about what makes good turkey nesting and brooding habitat, and those habitat conditions may not be what people have traditionally thought.

“Turkey poults are basically nature’s chicken nuggets, everything eats them. Good nesting habitat, with good brooding habitat nearby, is crucial,” Oakley said.

Once poults can roost off the ground, their survival chances increase substantially, making the two-to-three-month window between when eggs are laid and the poults can fly extremely important.

Videos and workshops have been the main venue of communication for both the public and MDC land managers. The new *Turkey Habitat* website (short.mdc.mo.gov/4Fz) houses many valuable resources for land managers to reference when looking for habitat improvements. The recommendations and resources can help landowners protect the tiny “chicken nuggets” running around their property and increase the turkey population statewide.



A technician uses a radio tracker to locate previously tagged wild turkey.

PLANNING TO SUCCEED

Efficiency coaches and experts frequently rely on the suggestion that “a failure to plan is a plan to fail.” With deer, bear, elk, turkey and many other fish and wildlife species, plans exist — and constantly evolve — to ensure their continued success and their continued presence on Missouri’s outdoor landscape. ▲

Lauren Hildreth is a wildlife programs coordinator in MDC’s Statewide Resource Management Branch. She lives in Jefferson City with her husband, the department’s deer and elk biologist, and their three kids. She enjoys running around outside with her family and passing on a love of wildlife to her kids.



A large number of birds, likely swallows, are shown in flight against a light, overcast sky. The birds are scattered throughout the frame, with some in the foreground and others further back, creating a sense of a large flock. The birds have dark wings and bodies with lighter underparts. The title "Birds of" is written in a large, bold, yellow serif font, with the word "Birds" being significantly larger than the word "of".

Birds of



Summer

by Matt Seek

“One swallow does not make a summer.”
— Aristotle

Far be it from me to argue with Alexander the Great’s favorite tutor, but I think Aristotle got it wrong.

As a schoolboy growing up along the soggy shores of Fountain Grove Conservation Area (CA), my summers were bookended by the comings and goings of swallows. Without benefit of a calendar, I learned that the arrival of April’s first barn swallow, gliding across our lawn like a figure skater on ice, meant I would soon be free of classroom captivity. And in August, when utility lines along the blacktop began to sag with gregarious flocks of southbound swallows, I knew my idyllic and carefree days were ticking to an end.

A SURVEY OF SWALLOWS

The swallows of Aristotle’s Classical Greece, separated by thousands of miles and hundreds of generations from those of my Missouri childhood are, incredibly, the same species, *Hirundo rustica*, the ubiquitous barn swallow. But you wouldn’t know it by looking at them.

Greek barn swallows, like those found across Europe and western Asia, have a pale, often snow-white belly with a steely blue band across the chest. North American barn swallows sport buffier bellies — as if they were dusted with cinnamon — and lack a complete chest band.

Whatever form they take, barn swallows are one of the world’s most cosmopolitan birds. They chase summer from one hemisphere to the other, nesting throughout North America, Europe, and Asia, and wintering in South America, Africa, and northern Australia. You’re as likely to spot one wheeling over a Midwest pasture as you are to see one swooping under the Ponte Vecchio in Florence, Italy, or swirling over herds of zebras on the plains of Tanzania. They’ve even been spotted in Antarctica, likely blown far off course by storms.

Worldwide, more than 90 species of swallows fly the skies. Twenty-three species occur in North America, but many of them are confined to Central America or the Caribbean. About eight kinds of swallows regularly turn up in the United States, and six of them nest in the Show-Me State.

Missouri's swallows range in size from the purple martin, which is slightly smaller than a robin, to the bank swallow, which is barely bigger than a sparrow. Some are dazzlingly colored, like the tree swallow, whose iridescent blue feathers shimmer like an oil slick in the sun. Others, like the northern rough-winged swallow, wear an understated cloak of dusty brown feathers. Some nest in birdhouses, some in barns, some burrow into stream banks. Although each species has its own idiosyncrasies, they all make a living the same way — by catching insects on the wing.

BILLION BUG HIGHWAY

If you were to lie outside on a summer day and gaze into the clear blue sky, you probably wouldn't see much. Maybe a few wispy clouds. Or a bird fluttering past. But there are literally billions of creatures suspended in the air above our heads. We just can't see them.

To find out how much life might be up there, English entomologists used precision radar to calculate the number of insects flying over south-central England. The radar was extraordinarily sensitive, capable of detecting anything more massive than 2 milligrams. (To put that in perspective, a mosquito is about 2.5 milligrams.) For more minute creatures — like midges or fruit flies — the biologists dangled insect nets from balloons floating at various heights.

The results of their study, published in a 2016 issue of the journal *Science*, were staggering. More than 3.5 trillion insects, spiders, and other arthropods — equivalent to 3,200 tons of biomass — pass over cold, damp southern England each year. In warmer, sunnier places (like Missouri), nearly 6 billion insects may pass overhead in a single summer month.

Biologists call this buzzing, fluttering, drifting swarm of life “aerial plankton.” And swallows, like whales of the skies, are perfectly adapted to use it for food.

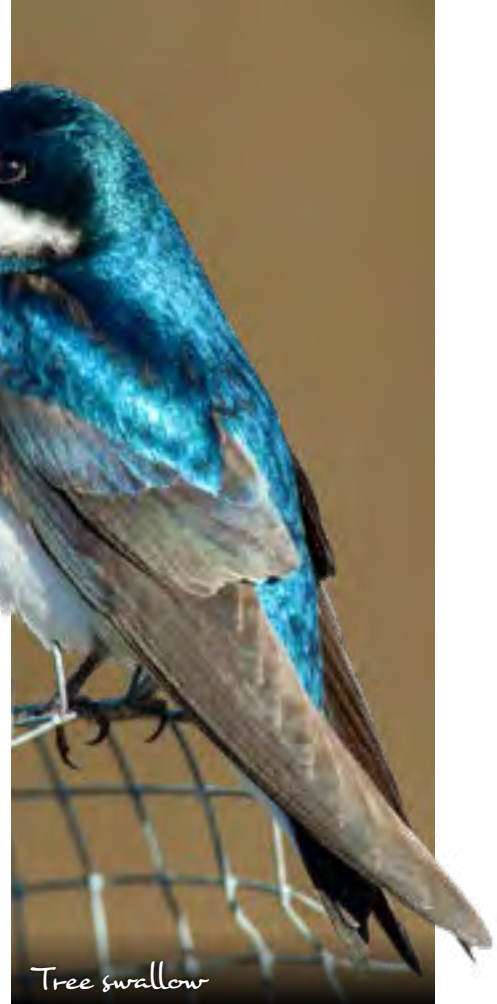
WHALES OF THE SKIES

With its beak snapped shut, a tree swallow resembles a button-nosed Hollywood ingenue. But the swallow's dainty beak disguises a truly cavernous mouth. Wide open, the bird's gaping maw conjures up images of a yawning hippopotamus or a hungry humpback whale. The oversized mouth serves an important purpose. Like a catcher's mitt, it offers an extra-large target for bagging fast-flying objects.

But to bag bugs, you first must find them. The atmosphere is enormous, most insects are tiny, and the pesky critters don't stay put for long. Swallows must spend hours on the wing to catch enough bugs to fill their bellies. They accomplish this with two energy-saving adaptations — pointed wingtips and low wing loading.

At each wingtip, air spills out from the high-pressure area under the wing to the low-pressure area above it. This forms a vortex that creates drag, slowing a bird down. Wings that taper to knife-edged points — like those of nearly all swallows — reduce the surface area where vortices form, enabling faster, more efficient flight.

Biologists use the term “wing loading” to compare the mass of a bird with the area of its wings. Chunky birds like wild turkeys — which can weigh over 20 pounds yet have relatively stubby, 50-inch wingspans — have high wing loading. Purple martins, Missouri's largest swallow, weigh less than 2 ounces (about as much as 10 nickels) yet have wingspans that stretch nearly 16 inches. As you might expect, swallows have exceptionally low wing loading and require comparatively little energy



Tree swallow

to stay aloft. In other words, comparing a wild turkey to a purple martin would be like comparing the fuel efficiency of an Airbus 380 to a hang glider.

Swallows are so efficient at flight that they spend the majority of their lives aloft. Barn swallows were found to spend 75 percent of their waking hours airborne, and tree swallows spend up to 80 percent.



Barn swallow

Tree swallow



Cliff swallows



Barn swallows



Cliff swallows



Barn swallows



Bank swallows

Swallows eat on the wing and even drink and bathe while aloft, skimming the surface of a pond or marsh so they can dip their beaks or bodies in the water. But there's one activity that brings these virtuosos of the sky back down to earth, raising babies.

MASTER BUILDERS

In spring, the entrance road to Eagle Bluffs CA is the only dry stretch for miles. Marshes and mudflats abound, and if you park beside one of the puddles, you'll soon witness the animal equivalent of a Saturday morning mob of DIYers descending upon a home improvement store.

Hundreds of cliff swallows swarm the mud holes, touching down for a few moments and then streaking away in a flurry of feathers. Using their beaks like trowels, the birds scoop up mouthfuls of mud and fly back to the construction site, in this case, the I-beam of a nearby bridge. Mouthful by mouthful, the birds construct dozens of gourd-shaped nests, all jumbled together higgledy-piggledy like barnacles on a ship.

Both males and females share nest construction duties. Some of the birds — older ones who arrive earlier in the season — repair existing nests. Other birds start from scratch, mortaring mouthfuls of mud to the wall of the bridge with a shaking motion of their beaks. The shaking is a key requirement in the swallow building code. It causes the mud to release some of its liquid, allowing the glop to seep into cracks and crevices. This results in a more solid foundation once the mud dries. The feathered bricklayers first construct a narrow, semicircular ledge and then stand atop this muddy scaffolding to finish the walls and roof of the nest. On average, it takes about seven days and 900 to 1,200 mouthfuls of mud to build a nest from scratch.

Once construction is complete, nest owners sit in the tubular entrance and lunge at neighbors who stray too close. Birds steal wet mud from untended nests, and squatters often try to usurp existing residents. When that happens, invaders are met with vicious resistance, getting pecked and bludgeoned by

the nest's rightful owners. Feathers are plucked out, and sometimes the scuffle tumbles out of the nest and into the river below.

Watching a cliff swallow colony is a bit like watching a soap opera — in more ways than you might think.

THE AFFAIRS OF SWALLOWS

To the casual observer, cliff swallow couples seem monogamous. One male and one female tend to a nest. But numerous trips to the mudflat offer numerous opportunities for extra-marital hanky-panky. In a Nebraska study, 43 percent of cliff swallow nests contained a nestling that wasn't related to one of its parents.

For many swallow species, infidelity is the rule rather than the exception. In male purple martins, the younger you are, the more likely it is your mate will stray. In one study, nearly half of yearling males had offspring in their nests that were unrelated to them, but less than 10 percent of older males did. Male bank swallows are more likely to chase heavier females because females weigh most right before laying an egg. And barn swallows sometimes kill another male's nestlings in an attempt to break up the pair and mate with the female. Often, it works.

But the epitome of avian infidelity is the tree swallow. Using DNA fingerprinting, researchers found that in some populations, nearly 90 percent of nests contain offspring not descended from the male tending the young. Females

Show-Me Swallows

may be seeking insurance that their eggs will be fertilized. But stronger evidence supports the idea that tree swallows stray simply to ensure their offspring are genetically diverse. In the game of natural selection, a poker hand containing a mixture of suits is more likely to win against one containing only diamonds.

MIGRATION MAELSTROM

By August, a new generation has fledged, and the affairs of summer are over. North America's swallows then turn their attention to migration.

In a farm field north of Swan Lake National Wildlife Refuge, the show starts at dusk. The western horizon, orange as a ripe mango, begins to darken, but not from the sun winking out. A massive cloud billows closer, swelling like a desert sandstorm. Soon, a whirlpool of swallows churns in the heavens overhead. The murmuration shrinks and expands, swoops and sails, and a finger of birds snakes to the ground, as if a funnel cloud were spawning a tornado. Once the scouts declare that the surface is safe, thousands upon thousands of swallows swirl down, and the sky empties in a torrential downpour of birds.

Unlike many songbirds, swallows migrate during the day, presumably so they can forage for insects as they put miles behind them. At night they gather in enormous, mixed-species flocks to roost and rest. The flocks can grow so large — hundreds of thousands of birds — that they show up on weather radar like a blossoming storm.

Tree swallows and northern rough-winged swallows winter along the Gulf Coast and Central America. Missouri's other species push farther south into Amazonia, Chile, and Argentina. These long-distance migrants spend half of their lives in transit, arriving on wintering grounds in November and migrating north again in February.



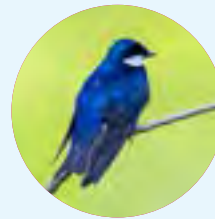
BANK SWALLOW

Riparia riparia

Habitat: Open areas near rivers and reservoirs

Nest: Burrows dug into eroded stream banks, bluffs, and road cuts

Male bank swallows arrive on nesting grounds before females. Using their tiny beaks and scrawny legs, males dig a 2-foot-long burrow into loose soil. When females arrive, they choose a mate based on the quality of his burrow.



TREE SWALLOW

Tachycineta bicolor

Habitat: Open areas near water, such as marshes, rivers, and reservoirs

Nest: Tree cavities, abandoned woodpecker holes, and nest boxes

Unlike other swallows, which are strict insectivores, tree swallows can supplement their diet with berries. This allows them to arrive earlier to nesting grounds than other swallows.



NORTHERN ROUGH-WINGED SWALLOW

Stelgidopteryx serripennis

Habitat: Open areas near water, such as marshes, rivers, and reservoirs

Nest: Burrows made by other animals, such as bank swallows or kingfishers

Northern rough-winged swallows are named for the numerous tiny barbs on the leading edge of a male's outermost flight feathers. The purpose of the barbs remains a mystery to biologists.



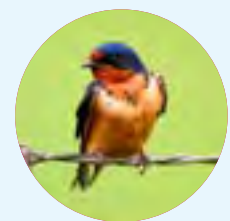
PURPLE MARTIN

Progne subis

Habitat: Backyards, parks, and pastures

Nest: East of the Rockies, purple martins nest almost exclusively in birdhouses and gourds.

Claims by birdhouse manufacturers that martins eat thousands of mosquitoes aren't based in fact. Martins forage during the day and hunt higher than most swallows, usually over 150 feet. Mosquitoes are most active at night and fly much lower.



BARN SWALLOW

Hirundo rustica

Habitat: Backyards, parks, pastures, and wetlands

Nest: Open-topped cup of mud on the walls and rafters of barns or sheds, also under bridges and overpasses

Barn swallows (along with purple martins, cliff swallows, and tree swallows) have adapted well to human-caused habitat change. Three hundred years ago, barn swallows nested on cliffs and in caves. Today, with few exceptions, they nest exclusively on human-made structures.



CLIFF SWALLOW

Petrochelidon pyrrhonota

Habitat: Nearly anywhere there's a vertical surface for nesting, but often near water

Nest: Gourd-shaped mud nests plastered to the side of cliffs, caves, and bridges

Among the world's swallows, cliffies are the most gregarious nesters. Colonies regularly top 1,000 nesting pairs, and a long-used colony in Nebraska contains over 3,500 nests.



Barn swallow

NOPPADOL PAOTHONG

HARD TO SWALLOW

A few years ago, I was on the road back to my parents' house when I noticed something strange. I'd been driving for miles through humid farm country, but my windshield, usually splattered with so many bugs that it resembled a Jackson Pollock painting, was alarmingly clean.

Around the same time, newspaper headlines began popping up, warning of an "insect apocalypse." Fanning the media frenzy was an analysis of population data in the journal *Biological Conservation*. The authors reported 40 percent of the world's insect species were declining, and a third were endangered. Insects, the study led one to believe, were hurtling toward extinction, threatening a "catastrophic collapse of nature's ecosystems."

Since then, the Threatcon level has been dialed down as subsequent studies offer evidence that insect losses aren't so precipitous. But that doesn't mean biologists aren't alarmed. Insect numbers are declining. And their losses *will* ripple through ecosystems. It's probably already happening.

Biologists believe nearly a third of North America's birds — a net loss of about 3 billion individuals — have disappeared since 1970. And aerial insectivores like swallows are among the most steeply declining groups. Bank swallow numbers in North

America have crashed by nearly 90 percent since 1970, and six other swallow species in the United States have declined, though not so alarmingly.

While biologists work to tease out causes for swallow losses — as with most ecological problems, they're likely numerous, complex, and intertwined — I can't help but remember my clean windshield and suspect the dots connect to problems in the food chain. When insects disappear, so do the birds that eat them.

Perhaps this notion has clouded my memory. After all, Partners in Flight lists Missouri's swallows — with the notable exception of bank swallows — as being of "low conservation concern." Yet over the past several summers, the utility lines at my parents' home have seemed to sag a little less. Maybe rose-tinted glasses have caused me to remember more birds in the 1980s than there truly were. Or maybe not. Maybe the swallows of my youth are disappearing, year by year, bird by bird. And if so, maybe Aristotle was right.

A single swallow, perched alone on a utility line, would make for a poor summer indeed. ▲

Matt Seek is the editor of Xplor, MDC's magazine for kids.



CAVE SWALLOW

Petrochelidon fulva

Cave swallows are an extremely rare visitor to Missouri, with only three reliable records in the state. The last one to visit was spotted at Schell-Osage Conservation Area in 2019.

Get Outside

in

AUGUST

→ Ways to connect with nature

Having a "Grape" Summer

Missouri is home to eight varieties of wild grapes. Six are common — the **summer**, winter, red, riverbank, sand, and frost grape.

The fox and muscadine grapes are less common. The summer grape is the official grape of Missouri and is used mostly in the state's wine industry.

To learn more about Missouri's wild grapes, visit short.mdc.mo.gov/4yf.

Here Comes the Sun

Sunflowers are one of the easiest recognized flowers. Missouri is home to 16 different species of sunflowers and August is a great time to get out and see them. They can be found in a lot of places, including prairies, glades, openings in forests, pastures, fields, roadsides, and banks of streams and rivers. For more information about this sunny flower, visit short.mdc.mo.gov/4dG.

Poking Around for Pocketbooks

As we try to survive these hot, waning days of summer, we often take to the water to cool off. If you are heading to a nearby pond, stream, or lake, keep an eye out for **freshwater mussels**, like the plain pocketbook, one of the state's most common and widespread mussels. Missouri is home to nearly 70 species of these aquatic animals, and they are breeding this month. They are often found buried in substrate. You can see live mussels by snorkeling, using water scopes, or hand-groping in shallow water. When returning a live mussel to the water, make sure the hinge, where the two halves of the shell are joined, is pointing up.

Natural Events to See This Month

Here's what's going on in the natural world.



Elephant's foot blooms.



Earthstars appear. This fungus is not edible.



Shorebirds begin migrating south.

VIRTUAL

VIRTUAL HUNTING SERIES: Bow Hunting

Thursday • Aug. 21 • 5:30-6:30 p.m.

Online only

Registration required by Aug. 20. To register, call 888-283-0364 or visit short.mdc.mo.gov/4yN.

All ages

This course is designed to help you prepare for bow season with a session on gear, proper clothing, stands, calls, and techniques to improve your chances of success. We will discuss best bow hunting practices, safety, and how bow hunting differs from hunting deer with a rifle.

VIRTUAL

LEARN TO FISH: Virtual Fly Tying with T.J. and Mike

Thursday • Aug. 21 • 6-7 p.m.

Online only

Registration required by Aug. 20. For more information, call 888-283-0364 or visit short.mdc.mo.gov/4yp.

All ages

Come and tie flies with T.J. and Mike. The theme is Zonker strips. We will be diving into the versatility of rabbit Zonker strips.

Last Call for Summer

Indigo buntings are one of the few birds that sing on hot, humid summer afternoons. The male is a beautiful blue, while the female is a muted brown. Their song is a series of whistled couplets, with each couplet usually slightly lower in pitch — *sweet-sweet, tew-tew, chew-chew*. Their call is a sharp *spit*.



American badgers breed.



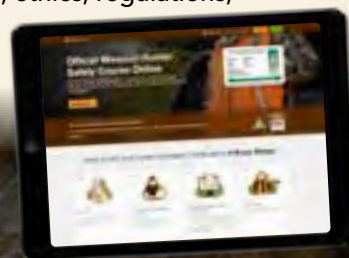
Bullsnake eggs hatch.

BECOME HUNTER EDUCATION CERTIFIED ONLINE TODAY!

Missouri adults 16 and older can complete hunter education training all online.

- ✓ Flexibility to learn at your own pace
- ✓ Access 24/7
- ✓ No in-person skills session required

The all-online course includes engaging video and animation on hunter safety, firearm safety, ethics, regulations, and wildlife management.



LEARN MORE ABOUT
MDC'S HUNTER EDUCATION
PROGRAM AT [MDC.MO.GOV/
HUNTEREDUCATION](https://MDC.MO.GOV/HUNTEREDUCATION)

Places to Go

KANSAS CITY REGION

Amarugia Highlands Conservation Area

A tale of two monarchs

by Larry Archer

✧ Once considered its own kingdom by the fur trappers and other residents of southern Cass County, the area known as Amarugia has evolved from the rule of a monarch to a habitat for monarchs. Instead of a king, it is now home to kingsnakes.

Dubbed the Kingdom of Amarugia in the early 1800s, nearly 1,100 acres of the area is now the Amarugia Highlands Conservation Area. And while the monarchy is gone, the terrain that shapes the area's name remains, according to Wildlife Biologist Rick Bredesen.

"There's a whole bunch of hills (Masters, Herrell, and Dorsett) and nearby mounds (Osborne and Christensen) in that part of Cass County," Bredesen said. "From those hills, you have some scenic views."

But most visitors come less for the views and more for the opportunity to cast a line in the area's 45-acre lake, which was completed in 1987 and upgraded a decade ago, he said.

"We drained the lake and renovated it, made it a little deeper along the shoreline for vegetation, and restocked it," he said.

Later in the year, if the weather's been generous with rain, the area's 100-acre wetland also draws waterfowl hunters and birders interested in migratory waterfowl and shorebirds.



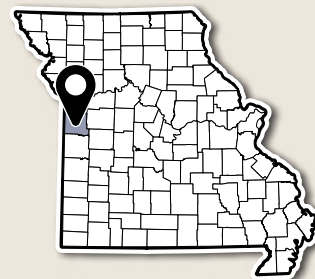
"You get out early in the morning and late in the evenings. That's when you're going to see wildlife anyway, so it's actually a pretty pleasant time of the day."

—MDC Wildlife Biologist
Rick Bredesen

DAVID STONNER



The 45-acre lake at Amarugia Highlands CA draws its share of anglers during the summer, while the nearby wetlands (inset) draw waterfowl hunters and birders later in the year.



AMARUGIA HIGHLANDS CONSERVATION AREA

consists of 1,081.4 acres in Cass County. From I-49/Highway 71 at Archie, take Route A west 5 miles, then Route W north 4.50 miles to the area.

38.5396, -94.4391

short.mdc.mo.gov/4yj 816-622-0900

WHAT TO DO WHEN YOU VISIT



Bicycling Approximately 2 miles of improved and service roads.



Birdwatching The eBird list of birds recorded at Amarugia Highlands CA is available at short.mdc.mo.gov/4yH.



Field Trials Special use permit required.



Fishing Includes a 45-acre constructed lake, as well as numerous small ponds and access to a short section of the Grand River. Black bass, bluegill, catfish, sunfish.



Hunting Deer and turkey
Regulations are subject to annual changes. Refer to MDC's regulation page online at short.mdc.mo.gov/Zjw.

Also **dove, quail, rabbit, and squirrel.**



Trapping Special use permit required.

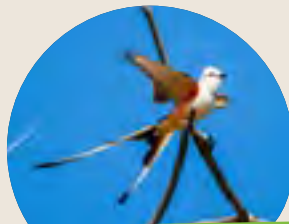


Waterfowl Hunting Open hunting. Waterfowl regulations are subject to annual change, so check the *Migratory Bird and Waterfowl Hunting Digest 2025-2026*.

WHAT TO LOOK FOR WHEN YOU VISIT



Eastern towhee



Scissor-tailed flycatcher



Beaver



Prairie kingsnake



Ruby-Throated Hummingbird

Archilochus colubris

Status

Common migrant and summer resident

Size

Length: 3¾ inches

Distribution

Statewide

Ruby-throated hummingbirds begin arriving in April, peak in August, and are almost gone by October. These pint-sized birds, with their needlelike bills, hover and fly forward and backward with a humming sound. They also make a variety of chips, squeals, and twitters.

Males are metallic green with a red throat that flashes ruby red in the light but otherwise may look black. Their tails are black and deeply forked. Females are also a metallic green. Their tails are tricolored — green at the base, black in the middle, with three outer tail feathers tipped with white.



HUMAN CONNECTIONS

People love to watch hummingbirds whether they're buzzing around a nectar feeder or flowers in a garden. Native-plant landscaping is a great way to feed hummers while also decorating your yard. Although red and orange flowers are most attractive to hummingbirds, blue, purple, and white flowers are also visited. Some favorites include beebalm, blazing stars, blue sage, wild columbine, fire pink, foxglove beardtongue, jewelweed, summer phlox, royal catchfly, and Solomon's seal.



ECOSYSTEM CONNECTIONS

Hummingbirds are important pollinators for many species of plants that require their needlelike bill. For example, hummingbirds serve as the eastern red columbine's number one pollinator. Their northward migration matches the columbine's bloom time. In addition, hummingbirds cross-pollinate trumpet creeper as they forage. In fact, the trumpet creeper's range nearly matches that of the ruby-throated hummingbird.

Outdoor Calendar

❖ MISSOURI DEPARTMENT OF CONSERVATION ❖



Free MO Hunting and MO Fishing Apps

MO Hunting makes it easy to view permits, electronically notch them, and Telecheck your harvest. MO Fishing lets you view permits, find great places to fish, and ID your catch. Get both in Android or iPhone platforms at short.mdc.mo.gov/Zi2.

FISHING

Black Bass

Impounded waters and non-Ozark streams:
Open all year

Most streams south of the Missouri River:

- Catch-and-Keep:
May 24, 2025–Feb. 28, 2026

Bullfrog, Green Frog

June 30 at sunset–Oct. 31, 2025

Nongame Fish Giggling

Impounded waters, sunrise to sunset:
Feb. 16–Sept. 14, 2025

Streams and impounded waters,
sunrise to midnight:
Sept. 15, 2025–Feb. 15, 2026

Paddlefish

On the Mississippi River:
Sept. 15–Dec. 15, 2025

Trout Parks

State trout parks are open seven days a week
March 1 through Oct. 31.

Catch-and-Keep:
March 1–Oct. 31, 2025

Catch-and-Release:
Nov. 14, 2025–Feb. 9, 2026

HUNTING

Black Bear*

Oct. 18–31, 2025

Bullfrog, Green Frog

June 30 at sunset–Oct. 31, 2025

Coyote

Restrictions apply during April, spring turkey
season, and firearms deer season.

Open all year

Crows

Nov. 1, 2025–March 3, 2026

Deer

Archery:

Sept. 15–Nov. 14, 2025
Nov. 26, 2025–Jan. 15, 2026

Firearms:

- Early Antlerless Portion
(open areas only): Oct. 10–12, 2025
- Early Youth Portion (ages 6–15):
Nov. 1–2, 2025
- November Portion:
Nov. 15–25, 2025
- CWD Portion
(open areas only): Nov. 26–30, 2025
- Late Youth Portion (ages 6–15):
Nov. 28–30, 2025
- Late Antlerless Portion
(open areas only): Dec. 6–14, 2025
- Alternative Methods Portion:
Dec. 27, 2025–Jan. 6, 2026

Doves

Sept. 1–Nov. 29, 2025

Elk*

Archery:

Oct. 18–26, 2025

Firearms:

Dec. 13–21, 2025

Groundhog (Woodchuck)

May 12–Dec. 15, 2025

Opossum, Raccoon, Striped Skunk

Aug. 1–Oct. 15, 2025

Pheasant

Youth (ages 6–15):

Oct. 25–26, 2025

Regular:

Nov. 1, 2025–Jan. 15, 2026

Quail

Youth (ages 6–15):

Oct. 25–26, 2025

Regular:

Nov. 1, 2025–Jan. 15, 2026

Rabbits

Oct. 1, 2025–Feb. 15, 2026

Sora, Virginia Rail

Sept. 1–Nov. 9, 2025

Squirrels

May 24, 2025–Feb. 15, 2026

Teal

Sept. 13–21, 2025

Turkey

Archery Portion:

Sept. 15–Nov. 14, 2025

Nov. 26, 2025–Jan. 15, 2026

Firearms Portion:

Oct. 1–31, 2025

Waterfowl

See the Migratory Bird and Waterfowl

Hunting Digest or visit short.mdc.mo.gov/ZZx
for more information.

Wilson's (Common) Snipe

Sept. 1–Dec. 16, 2025

Woodcock

Oct. 18–Dec. 1, 2025

TRAPPING

Opossum, Raccoon, Striped Skunk

Only foot-enclosing traps and
cage-type traps may be used.

Aug. 1–Oct. 15, 2025

**Only hunters selected through a random drawing
may participate in these hunting seasons.*

For complete information about seasons, limits,
methods, and restrictions, consult the *Wildlife
Code of Missouri* at short.mdc.mo.gov/Zib.
Current hunting, trapping, and fishing regulation
booklets are available from local permit vendors
or online at short.mdc.mo.gov/ZZf.



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on Instagram**

@moconservation

Black bear paws (photographed during a den visit while the bear was sedated for research purposes) were made for walking, and depending on the season and purpose, they can cover some ground. Bears will take anywhere from 2-mile strolls to 40-mile treks. Get your walking paws on! You may not hit 40 miles, but you are sure to soak up all nature has to offer. What will you discover?

📷 by **Noppadol Paothong**

Free to Missouri households

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